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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/933,743	08/22/2001	Jorn Tinnemeyer	C598 0001	6515
720	7590	01/06/2005	EXAMINER	
OYEN, WIGGS, GREEN & MUTALA 480 - THE STATION 601 WEST CORDOVA STREET VANCOUVER, BC V6B 1G1 CANADA			BELL, MELTIN	
		ART UNIT	PAPER NUMBER	
		2121		
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/933,743	TINNEMEYER, JORN	
	Examiner Meltin Bell	Art Unit 2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Office Action Summary

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 22 August 2001 and 16 October 2003.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-40 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1,2,4,5,24 and 36-38 is/are rejected.

7) Claim(s) 3,6-23,25-35,39 and 40 is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on 06 November 2001 is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)
2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
5) Notice of Informal Patent Application (PTO-152)
6) Other: _____

DETAILED ACTION

This action is responsive to application **09/933,743** filed **08/22/2001**, the preliminary amendment filed 10/16/2003 and the drawings filed 11/6/01. Claims 1-40 have been entered and examined. A first action on the merits of claims 1-40 follows.

Drawings

The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the drawings.

The drawings are objected to because:

- The 'USER INPUT' label for item 201 in Fig. 1 is not consistent with the specification on page 10, line 19 [0028], indicating item 201 as a 'program store'
- The 'Perform learning function' label for item 304 is not consistent with the specification on page 14, line 8 indicating 'training function is performed'
- The difference between Fig. 9's COARSE CALIBRATION and COARSE ADJUSTMENT item 906 is unclear on page 34, line 12
- 'R2, R3, R4' in Fig. 11B, item 1150 would read well as 'R1, R2, R3'.
- SoH and SoH_{RM} should be included in Fig. 14, item 1414 and Fig. 15, item 1514 as indicated on page 38, lines 6-9 and page 39, lines 4-7, respectively

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is required in correcting any errors of which applicant may become aware in the specification.

The disclosure is objected to because of the following informalities:

- 'using as an example of such a system a battery testing system' on page 6, lines 9-10 would read well as 'using a battery testing system as an example'
- 'to' on page 8, line 7 would read well removed
- International patent publication WO 00/19578 cited on page 4, lines 22-23 and referred to elsewhere in the specification (e.g. page 10, lines 10-12) should be included and sent with an Information Disclosure Statement
- a comma (',') should be placed after 'SoH_{RM}' on page 27, line 18, after 'match' on page 28, line 5, after '818' on page 28, line 10, after '4' on page 30, line 3 and after 'respectively' on page 30, line 4
- 'Figure 10' on page 29, line 6 would read well as 'Figure 9'
- '48' on page 33, Table VII would read well as '58'
- 'nine' on page 33, line 19 would read well as 'eight'

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1, 24 and 37 stand rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The language of the claims (e.g. "training", "parameter", "value", etc.) raise a question as to whether the claims are directed merely to an abstract idea that is not tied to a technological art, environment or machine which would result in a practical application producing a concrete, useful, and tangible result to form the basis of statutory subject matter under 35 U.S.C. 101. For example, if claim 1 was amended to recite a computer-implemented method and required performance of a result outside of a computer, it will be statutory in most cases since use of technology permits the function of the descriptive material to be realized.

Claim Rejections - 35 USC § 112

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 36 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The use of "substantially" in claim 36 is a broad term that lacks another comparative basis term for describing a particular characteristic of the invention.

Claim Rejections - 35 USC § 103

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Singh et al* USPN 6,456,988 "Method for determining state-of-health using an intelligent system" (Filed March 9, 1998) in view of *Jones et al* USPN 6,526,361 "Battery

testing and classification" (371 c1, 2, 4 Date July 5, 2000) and in further view of *Rine et al* "A reusable software adaptive fuzzy controller architecture" (February 1996).

Regarding claim 1:

Singh et al teaches,

- a) providing a set of fuzzy logic membership functions, the set comprising a plurality of membership functions corresponding to each of the input (column 4, lines 1-40) parameters (Abstract)
- b) obtaining parameter values from a system (Fig. 1, items 14a-b) for which the characteristic has a known value (Fig. 3, items 20-21)
- c) for each of the parameter values obtained from the system obtaining a system-specific set of fuzzy logic membership functions by scaling (column 4, lines 29-30) the corresponding plurality of membership functions
- d) using the system-specific set of membership functions to obtain outputs (column 4, lines 41-67) indicative of the characteristic of test systems

However, *Singh et al* doesn't explicitly teach the system is a calibration system or a set of fuzzy logic membership functions is a prototype set of fuzzy logic membership functions while *Jones et al* teaches,

- the system is a calibration system (column 1, lines 45-53)
- obtaining parameter values from a calibration system for which the characteristic has a known value (column 4, lines 9-12)

Rine et al teaches,

- a set of fuzzy logic membership functions is a prototype (page 635, left column, paragraph 2) set of fuzzy logic membership functions (page 635, left column, paragraph 3)

Motivation - The portions of the claimed method would have been a highly desirable feature in this art for producing a battery model having smaller variance (*Jones et al*, column 1, lines 53-58) and automatically training the membership functions (*Rine et al*, page 634, right column, paragraph 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Singh et al* as taught by *Jones et al* and *Rine et al* for the purpose of producing a battery model having smaller variance as well as automatically training the membership functions.

Regarding claim 2:

The rejection of claim 2 is the same as that for claim 1 as recited above since the stated limitations of the claim are set forth in the references. Claim 2's limitation is taught in *Singh et al*:

- the system comprises an electrochemical battery and the characteristic comprises a state of health of the battery (Abstract)

Regarding claim 37:

Singh et al teaches,

- providing a set of functions (column 4, lines 1-40), the set comprising a plurality of functions, each one of the functions corresponding to a corresponding one of the parameters (Abstract)

- obtaining parameter values from a system (Fig. 1, items 14a-b) for which the characteristic has a known value (Fig. 3, items 20-21)
- for each of the parameter values obtained from the calibration system, obtaining a system-specific set of functions by scaling (column 4, lines 29-30) the corresponding plurality of functions
- using the system-specific set of functions to obtain one or more outputs (column 4, lines 41-67) indicative of the characteristic of a test system

However, *Singh et al* doesn't explicitly teach calibration or the set of functions is a prototype set of functions while *Jones et al* teaches,

- the system is a calibration system (column 1, lines 45-53)
- obtaining parameter values from a calibration system for which the characteristic has a known value (column 4, lines 9-12)

Rine et al teaches,

- the set of functions is a prototype (page 635, left column, paragraph 2) set of functions (page 635, left column, paragraph 3)

Motivation - The portions of the claimed method would have been a highly desirable feature in this art for producing a battery model having smaller variance (*Jones et al*, column 1, lines 53-58) and automatically training the membership functions (*Rine et al*, page 634, right column, paragraph 3). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Singh et al* as taught by *Jones et al* and *Rine et al* for the purpose of producing a battery model having smaller variance as well as automatically training the membership functions.

Claims 4-5 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Singh et al* in view of *Jones et al* in view of *Rine et al* and in further view of *Shi et al* "A learning algorithm for tuning fuzzy inference rules" (22-25 Aug. 1999).

Regarding claim 4:

Singh et al teaches,

- a) providing a set of fuzzy logic membership functions, the set comprising a plurality of membership functions corresponding to each of the input (column 4, lines 1-40) parameters (Abstract)
- b) obtaining parameter values from a system (Fig. 1, items 14a-b) for which the characteristic has a known value (Fig. 3, items 20-21)
- c) for each of the parameter values obtained from the system obtaining a system-specific set of fuzzy logic membership functions by scaling (column 4, lines 29-30) the corresponding plurality of membership functions
- d) using the system-specific set of membership functions to obtain outputs (column 4, lines 41-67) indicative of the characteristic of test systems
- the system comprises an electrochemical battery and the characteristic comprises a state of health of the battery (Abstract)

However, *Singh et al* doesn't explicitly teach the system is a calibration system, a set of fuzzy logic membership functions is a prototype set of fuzzy logic membership functions or triangular membership functions completely specifiable by three numbers while *Jones et al* teaches,

- the system is a calibration system (column 1, lines 45-53)
- obtaining parameter values from a calibration system for which the characteristic has a known value (column 4, lines 9-12)

Rine et al teaches,

- a set of fuzzy logic membership functions is a prototype (page 635, left column, paragraph 2) set of fuzzy logic membership functions (page 635, left column, paragraph 3)

Shi et al teaches,

- the fuzzy logic membership functions are triangular membership functions completely specifiable by three numbers (page I-378, section 2.1, paragraph 2)

Motivation - The portions of the claimed method would have been a highly desirable feature in this art for producing a battery model having smaller variance (*Jones et al*, column 1, lines 53-58), automatically training the membership functions (*Rine et al*, page 634, right column, paragraph 3) and obtaining optimal fuzzy inference rules (*Shi et al*, Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made, to modify *Singh et al* as taught by *Jones et al* and *Shi et al* for the purpose of producing a battery model having smaller variance as well as automatically training the membership functions and obtaining optimal fuzzy inference rules.

Regarding claim 5:

The rejection of claim 5 is the same as that for claim 4 as recited above since the stated limitations of the claim are set forth in the references. Claims 5's limitation is taught in

Shi et al:

- each of the membership functions is specified by a left intercept point, a mid-point and a right intercept point (page I-378, section 2.1, paragraph 2)

Regarding claim 38:

The rejection of claim 38 is the similar to that for claims 37 and 4 as recited above since the stated limitations of the claim are set forth in the references. Claims 38's limitation is taught in *Shi et al:*

- the functions are triangular (page I-378, section 2.1, paragraph 2)

Allowable Subject Matter

Claims 3, 6-35 and 39-40 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form correcting objections to independent claims 1, 24 and 37 as well as including all of the limitations of the base claim and any intervening claims. The following is an examiner's statement of reasons for allowance:

The reasons for allowance of the claims are the limitations not disclosed in *Singh et al, Jones et al, Rine et al* and *Shi et al*. Specifically, the reason for allowance of claim 3 is the determining a chemistry type of the battery and selecting from a plurality of prototype sets of fuzzy logic membership functions a prototype set of fuzzy logic

membership functions which matches the chemistry type of the battery. Though *Beard USPN 5,780,992 "Rechargeable battery system adaptable to a plurality of battery types"* (July 14, 1998) discloses matching battery chemistry type in column 6, lines 44-50, the selecting from a plurality of prototype sets of fuzzy logic membership functions a prototype set of fuzzy logic membership functions which matches the chemistry type of the battery limitation is not disclosed in any of the cited or applied references. Similarly, claims 6-35 and 39-40 cite limitations patentable over

- *Buchmann "Artificial Intelligence Reads Battery State-of-Health in Three Minutes"* (2001)
- *Eastman "Guide to GIS and Image Processing"* (May 2001)
- *Bean; USPN 6,404,164; "Method of battery chemistry identification through analysis of voltage behavior"* (Filed May 14, 2001)
- *Blank et al USPN 6,512,937 "Multi-tier method of developing localized calibration models for non-invasive blood analyte prediction"* (Filed April 3, 2001)
- *Benson et al USPAPN 2002/0105428N 2002/0105428 "Fuzzy logic method for adaptively evaluating the validity of sensor data"* (Filed February 2, 2001)
- *Pedrycz et al "Information Granulation for Concept Formation"* (2000)
- *Cox et al "Battery State of Health Monitoring, Combining Conductance Technology with Other Measurement Parameters for Real-Time Battery Performance Analysis"* (2000)
- *Brooks "Smart Accelerometers with Wireless Interfaces for the Condition Monitoring Industry"* (May 2-5, 1999)

- *Spath et al* "The Detection of the State of Health of Lead-Acid Batteries" (1997)

Any comments considered necessary by the applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance"

Conclusion

The following prior art made of record is considered pertinent to applicant's disclosure:

- *Hoenig*; USPN 6,366,054; "Method for determining state of charge of a battery by measuring its open circuit voltage"
- *Jones et al*; USPN 6,208,114; "Battery monitoring system with integrated battery holder"
- *Saby et al* USPN 5,708,593; "Method for correcting a signal delivered by a measuring instrument"
- *Moravec et al*; USPN 5,596,260; "Apparatus and method for determining a charge of a battery"
- *Hayashi et al* USPN 5,651,100; "Approximate reasoning apparatus"
- *Wu*; USPN 5,758,025; "Dynamically adaptive fuzzy interval controller"
- *Kelly, III et al*; USPN 6,272,477; Hypertrapezoidal fuzzy dynamic state interpreter
- *Rees*; GBPAPN 2,377,833; "Monitoring Battery Performance During Operation"

- *Zhang et al*; Learning fuzzy concept prototypes using genetic algorithms; IEEE International Fuzzy Systems Conference Proceedings; Vol. 3; 22-25 Aug. 1999; pp 1790-1795
- *Mao et al*; Approximation capability of fuzzy systems using translations and dilations of one fixed function as membership functions; IEEE Transactions on Fuzzy Systems; Vol. 5, Is. 3; Aug. 1997; pp 468-473
- *Rao et al* "A tunable fuzzy logic controller for vehicle-active suspension systems"; Fuzzy Sets and Systems 85; 1997; pp 11-21
- *Florescu et al*; Heuristic linearization of external characteristics of DC-DC converters using fuzzy control; Proceedings of the IEEE International Symposium on Industrial Electronics; Vol. 1; 12-16 July 1999; pp 274-279
- *Chen et al*; On parametric t-norm-sum-gravity inference method for fuzzy logic control; IEEE International Conference on Fuzzy Systems Proceedings; Vol. 1; 4-9 May 1998; pp 510-515
- *Buchmann*; www.buchmann.ca/article14-page2.asp; "Battery Analyzers"; 2001

Any inquiry concerning this communication or earlier communications from the Office should be directed to Meltin Bell whose telephone number is 571-272-3680. This Examiner can normally be reached on Mon - Fri 7:30 am - 4:00 pm.

If attempts to reach this Examiner by telephone are unsuccessful, his supervisor, Anthony Knight, can be reached on 571-272-3687. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MB /AKB
December 30, 2004



Anthony Knight
Supervisory Patent Examiner
Group 3600